DOCUMENT RESUME

ED 476 852 TM 034 945

AUTHOR	Mason, Sarah A.
TITLE	Learning from Data: The Role of Professional Learning Communities.
INSTITUTION	Joyce Foundation, Chicago, IL.; Wisconsin Center for Education Research, Madison.
PUB DATE	2003-04-00
NOTE	29p.; Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, April 21-25, 2003).
PUB TYPE	Information Analyses (070) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01/PC02 Plus Postage.
DESCRIPTORS	*Administrators; *Educational Improvement; *Information Utilization; *Professional Development; *Teachers
IDENTIFIERS	*Learning Communities

ABSTRACT

This paper explores the role of professional learning communities in facilitating effective use of data by school administrators and teachers. The paper draws on three related research studies conducted in the Milwaukee Public Schools, Wisconsin. Grounded in systemic reform theory, the studies had a common goal to build the capacity of school staff to use data more effectively for continuous improvement and decision making to improve student learning. Knowledge management theory helps define what is meant by "effective use of data" in a systemic reform context, provides a useful framework for determining what it means to learn from data, and illustrates the successful use of data in school and classroom settings. This paper sheds light on what school staffs need to learn from data, the organizational barriers to learning from data, and how professional learning communities can contribute to improving the organizational culture and structure necessary for effective data use. Examples from recent research studies are used to illustrate why professional learning communities provide an ideal organizational structure to address both the challenges schools face and the needs of teachers as school staffs seek to learn from data and use it effectively to improve student learning. (Contains 34 references.) (Author/SLD)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 476 852

Learning from Data: The Role of Professional Learning Communities

Sarah A. Mason
University of Wisconsin–Madison

Abstract

This paper explores the role of professional learning communities in facilitating effective use of data by school administrators and teachers. The paper draws upon three related research studies conducted in Milwaukee Public Schools. Grounded in systemic reform theory, a common goal of the studies was to build the capacity of school staff to use data more effectively for continuous improvement and decision-making to improve student learning. Knowledge management theory helps define what is meant by "effective use of data" in a systemic reform context, provides a useful framework for determining what it means to learn from data, and illustrates the successful use of data in school and classroom settings. This paper sheds light on what school staffs need to learn from data, the organizational barriers to learning from data, and how professional learning communities can contribute to improving the organizational culture and structure necessary for effective data use. Examples from recent research studies are used to illustrate why professional learning communities provide an ideal organizational structure to address both the challenges schools face and the needs of teachers as school staffs seek to learn from data and use it effectively to improve student learning.

A paper presented at the annual conference of the
American Education Research Association, Chicago, April 2003

This paper reports results from three studies supported by the Joyce Foundation and the Wisconsin Center for Education Research. Any opinions, findings, and conclusions are those of the author and do not necessarily reflect those of the supporting agencies.

TM034945

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

S. A. Mason

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

BEST COPY AVAILABLE

Introduction

This paper builds a case for endorsing professional learning communities as an important organizational structure to support systemic reform, organizational learning, and effective use of data by school administrators and teachers. It is organized in five sections that: 1) describe the systemic reform context of the research studies; 2) define effective data use and what it means to learn from data; 3) present research findings that identify the challenges and needs school staff face in learning from and using data; 4) provide examples of professional learning communities that successfully address the challenges and needs of school staff seeking to learn from and effectively use data to improve student learning; and, 5) demonstrate the important role of professional learning communities in facilitating systemic reform, organizational learning, and using data effectively.

First, a brief overview of the development of systemic reform theory provides background for the research studies reviewed here. Research strands that emphasize district and school capacity-building for educational reform, and that recognize the importance of data in building human, social and structural capacity of schools, explain the focus of the research studies. The attributes of learning organizations and professional learning communities are then described. Similarities between the capacity-builders of systemic reform and the characteristics of learning organizations and communities of practice are highlighted.

Second, knowledge management theory helps define what is meant by "effective use of data" in a systemic reform context, provides a useful framework for determining what it means to learn from data, and describes what the successful use of data in school and classroom settings looks like.

Third, the findings from the research studies in Milwaukee Public Schools (MPS) are presented. Early research revealed that schools are not well organized to use data effectively. Seven challenges for schools to improve their organization to use data are identified. The results of teachers' interviews are used to develop an understanding of how school staff members currently use and learn from data and what they regard as needing improvement.

Fourth, the findings from our most current research with professional learning teams are summarized and examples are used to demonstrate how these teams address the key data challenges and needs identified by earlier research.

Finally, the paper concludes by summarizing the role of learning communities in facilitating systemic reform, organizational learning, and effective data use. Professional learning communities are shown to address the expressed data challenges and needs of school staff, demonstrate how schools succeed in meeting systemic reform goals, and make effective data use and learning from data possible.

Theoretical Background and Research Base

Systemic Reform Research Context

Systemic reform theory is based on the belief that an aligned system of standards and instructional guidance at all levels of the educational enterprise is critical to improving the quality of teaching and learning. At the heart of systemic reform theory are standards that, when linked with other components of systemic reform—such as accountability, curriculum, instruction, professional development, assessments, school autonomy, school improvement, and support mechanisms from states and districts—serve to create more effective schools and higher levels of student achievement (Clune, 1998).

Since its introduction in the early 1980s, systemic reform theory (and related research) has gained momentum and has expanded in breadth and depth (Fuhrman, 1999). Studies of systemic reform policies and practice have evolved to encompass analysis of the components of reform at and between various organizational levels, the context in which the reform is taking place, and the capacity of educational organizations to change and achieve the goals of reform (Century, 2000; Clune, 1998; Furhman, 1999). Additionally, systemic analysis has moved beyond the state level to become an important lens for researchers seeking to understand how standards-based policy and practice play out at the district and school levels and influence teaching and learning in the classroom.

Researchers have studied capacity as it relates to the ability of educational organizations to achieve systemic reform goals. Of particular relevance are studies of capacity that focus on an organization's ability to learn by coordinating human, social, organizational, and structural capital and by making effective use of data. Spillane and Thompson (1997) show that local capacity for systemic reform can be thought of in terms of the organization's ability to learn through building human, social, and financial capital. Features of human capital include knowledge, commitment, and disposition of local reformers. Social capital is defined as professional networks, trust, and collaboration, where those within the system learn from each other and from those outside the system. Financial capital refers to the local organization's capacity to mobilize resources such as time, staffing, and materials for implementing change. Century (2000) essentially agrees, but employs four categories of capacity (compared to the three presented by Spillane and Thompson) to analyze systemic efforts: 1) intellectual proficiency and will (human capacity); 2) interaction, collaboration, and communication (organizational capacity); 3) fiscal resources (material capacity); and, 4) policies, procedures, and formal practices (structural capacity).

Systemic reform researchers have continually been interested in assessing the role of data in developing and sustaining systemic improvements in student learning. Recently, however, a number of studies have shifted the analysis of the analytical capacity of systemic systems from a focus on using data for accountability to building the human and social capacity of schools to use data for school improvement, decision-making, and improving instruction. Diane Massell (1998) believes that data-based decision making is an important tool of educational improvement, but has found that

making data useful is one of the continuing challenges of building capacity in systemic reform. Massell is interested in understanding the influence of accountability mechanisms and student performance measures on teachers and administrators. Key to developing this understanding is investigating how teachers and administrators interpret and use performance data and how that translates into action. Massell suggests that most accountability models assume that practitioners understand what performance data mean and that they have the knowledge and skills to translate these data into appropriate action. Massell's research on the National Science Foundation's Statewide Systemic Initiatives (1998) noted weaknesses in both of these assumptions. She reports that teachers and administrators are not trained (a) to interpret test statistics or the relevance of data to school improvement or (b) to use data to identify strategies that will improve instruction. Fuhrman (1999) also supports the use of data for monitoring organizational processes—reform as implemented—suggesting that reforms must be linked to outcomes designed to achieve continuous improvement of both elements.

Improving the organizational capacity of districts and schools to coordinate resources around coherent goals of student achievement and to use data as a guide for instructional improvement is the focus of the research we conducted in the Milwaukee Public Schools. Grounded in systemic reform theory, a common feature of each study was to build the capacity of school staff to use data more effectively for continuous improvement and decision making in the effort to improve student learning.

Learning Organizations and Professional Learning Communities

External influences such as increases in required testing, emerging accountability systems at state and district levels, and the 2001 revisions to the *Elementary and Secondary Education Act (ESEA)*[1] have put pressure on school staffs to understand and respond to a growing set of data on school and student performance. Similarly, reform efforts typically require schools to evaluate the implementation and effects of new strategies or programs. Internally, school administrators are looking for new ways to increase the capacity of their staffs to reflect upon and use data to improve instruction and learning. Schools are being encouraged to become "learning organizations" and to develop transformational approaches to school improvement through collaboration, inquiry, and continuous improvement. One approach is to build professional learning communities at the school to facilitate organizational change and educational improvement among staff members and across the school. A brief review of the literature reveals the common attributes of learning organizations and professional learning communities and highlights the important role data can play when used in these organizational structures to build capacity for school-level educational improvement.

Current literature recognizes that an important key to developing capacity for educational improvement lies in the successful development of the school as a "learning organization" (Fullan, 1993). For a school to be a learning organization, schools must overcome fragmentation in their reform efforts, form alliances and partnerships outside

[1] No Child Left Behind Act of 2001 (Public Law 107–110, 115 Stat. 1425; reauthorization of the Elementary and Secondary Education Act; http://www.ed.gov/offices/OESE/esea/).

the school, solve problems collectively, focus on changing teaching and learning, and develop shared values and beliefs about learning and change, all while remaining receptive to learning on a continuous basis within a changing educational environment (Fullan, 1993). Educational policymakers, researchers, and practitioners agree that this kind of school transformation requires more than just the restructuring of schools (i.e., changing organizational hierarchies, governance structures and planning groups); it is also about "re-culturing" schools by creating new ways of thinking and doing among all members of the staff (Louis, Marks, & Kruse, 1996; see also Scribner et al., 1999; Eaker, DuFour, & Burnette, 2002). Louis, Marks, and Kruse write that such learning organizations are characterized by "shared norms and values, collective focus on student learning, collaboration, deprivatized practice and reflective dialogue." Newmann, King, and Youngs (2000) assert that improvements in student achievement are most affected by instructional quality and that improvements in instructional quality require both promoting teacher learning and developing school capacity:

> Researchers tend to agree that to promote the kind of teacher learning that leads to improvement in teaching, professional development should concentrate on instruction and student outcomes in teachers' specific schools; provide opportunities for collegial inquiry, help and feedback; and connect teachers to external expertise while also respecting teachers' discretion and creativity. Finally, these experiences should be sustained and continuous, rather than short-term and episodic (p. 259).

Newmann et al. (2000) also argue that adherence to these points enhances individual professional development, but conclude from their research that effective schools must also develop these points in conjunction with school organizational capacity. Among the aspects of school capacity they regard as important are the development of professional community and teachers' knowledge skills and abilities. King and Newman (2000) reiterate these findings in another article, writing that, to develop their "knowledge, skills and dispositions," teachers need to be engaged in "an organized, collective enterprise" such as professional communities.

In their efforts to become learning organizations, schools often set up professional learning communities. Professional communities are school-based, teacher-centered organizational structures that are linked to organizational culture in such a way as to promote organizational learning and improvement in schools (Scribner et al., 1999). Structurally, professional communities vary depending on the size and complexity of the staff, scheduled planning time, and level of teacher empowerment at the school. How the school organizes and increases its human and social resources—such as innovation, leadership, respect, feedback, and staff development—also influences the makeup of professional community. Professional communities affect organizational culture by creating an environment where teachers are grounded by their shared values, beliefs, and dispositions, are continuously learning, and are critically reflective (Louis, Marks, & Kruse, 1996). A short review of the literature reveals a set of common attributes of professional communities. Professional learning communities are:

- Inquiry-based
- Focused on student learning
- Goal- and results-oriented
- Collaborative
- Reflective
- Based on shared values and beliefs
- Committed to continuous improvement

(Fullan, 1993; Murphy & Lick, 2001; Eaker, Dufour, & Burnette, 2002; King & Newmann 2000; Glickman, 2002; Brandt, 2003).

Integral to the successful functioning of learning organizations and professional communities is the use of data and information to enhance inquiry, continuous improvement, reflection, and learning. In their guide to building professional community, Eaker, Dufour, and Burnette (2002) encourage professional learning communities to become "research-based" and "data-driven." Similarly, Brandt (2003) encourages learning organizations to "gather, process and act upon information," as well as to exchange and get feedback on that information. Murphy and Lick (2001) stress the importance of making data-based decisions throughout the inquiry process to inform planning, implementation, and evaluation. Schmoker (2001) provides specific examples of how schools and districts have integrated the use of data and information into their learning communities, specifically noting the importance of "teachers reviewing assessment data for the purpose of improving practice." Feldman and Tung (2001) report that teachers change their attitudes and practices in schools that use data-based inquiry; as a result, a more professional culture emerges, facilitating professional dialogue and reflective practice. Clearly, the use of data contributes significantly to the process of learning and improvement in professional communities and learning organizations.

The literature on learning organizations and professional communities demonstrates that a large part of a school's capacity to be effective and improve depends on how it is organized to learn. A school's capacity to learn is defined by a combination of its human, social, structural, and organizational capital (see Century, 2000). The common attributes of school learning organizations and professional learning communities provide the structure and culture conducive to organizational learning by focusing on the following: teaching and learning; collaboration among staff and with external partners; inquiry-based learning and reflection, shared values, norms, and dispositions of teachers, and a commitment to continuous improvement. When imbued with data and information, learning organizations and professional learning communities can maximize these attributes to positively affect professional learning, educational change, and reform.

Learning from Data

What do "learning from data" and "effective data use" mean? Knowledge management theory helps define these terms in a systemic reform context and provides a useful framework for determining the successful use of data in school and classroom settings.

Knowledge management theory is based primarily on the research of business schools in the United States and Europe seeking to develop better ways for organizations to manage information, develop and sustain complex information technology systems, and learn from data. Laura Empson (1999) explains the continuum of data, information, and knowledge. She contends that knowledge is a product built from data and information:

> Data are objective facts, presented without any judgment or context. Data becomes information when it is categorised, analysed, summarized, and placed in context. Information therefore is data endowed with relevance and purpose. Information develops into knowledge when it is used to make comparisons, assess consequences, establish connections, and engage in a dialogue. Knowledge can, therefore, be seen as information that comes laden with experience, judgment, intuition, and values. (p. 8)

Thorn (2000) suggests that the transformation of data to knowledge is an important knowledge management strategy for decision makers at all levels of the educational system—including school-level administrators and staff. Knowledge management strategies add value to data, and when data is transformed into knowledge, educational systems are better able to manage complex information, use data for decision-making, and improve systemic reform efforts (Thorn, 2002). Knowledge management can also be thought of as the effective use, or application, of data. Thorn points out the importance of organizational culture in enabling or blocking the use of knowledge. Citing Davenport and Davenport (1999), he highlights their suggestion that the willingness to engage in problem-solving processes and to share information with "outsiders" is an important resource for enabling knowledge management efforts. The Davenports conclude that cultures that support knowledge accumulation and application will produce the most effective, efficient organizations.

Fullan (2001) also references the knowledge management literature, noting the importance of the concepts of knowledge building, knowledge creation, and knowledge sharing for educational organizations. Fullan transfers information technology and business concepts into educational settings. He suggests that information is best transformed into knowledge and learning in a social context. It is important that the exchange and sharing of information take place in the context of the school: " . . . it is local networks that count, because it is when we are learning in context that knowledge becomes specific and usable" (p. 104). Fullan concludes that district and school organizations with collaborative cultures are poised to tap into information and the tacit knowledge of professional staff, which can be enhanced through exchange with similar organizations.

Taken together, systemic reform theory and knowledge management theory help define what it means for school staff to "learn from data" and "use data effectively." Learning from data means to transform data into information as it is interpreted in context. Data then becomes knowledge as it is shared, applied, and used to promote

change and improvement throughout an organization. Knowledge creation becomes systemic when it is shared within the school and across the system to raise the effectiveness of reform efforts and improve teaching and learning. Fundamental to each of the research studies we conducted was the belief that the capacity of schools to improve local decision making, instructional guidance, and student achievement and to sustain school improvement would be enhanced through the systemic use of data within such a learning environment.

Findings from Milwaukee Public Schools

Research Purpose and Methods

The analysis draws upon the three Milwaukee research studies, each supported by grants from the Joyce Foundation, and conducted in Milwaukee Public Schools (MPS) over the last six years: *The Center for the Study of Systemic Reform in Milwaukee Public Schools (SSR-MPS)*, *The Study of Electronic Information Systems in Milwaukee Public Schools*, and *Strategies and Models for Improving Student Learning through Effective Data Use (SMILE)*. MPS includes nearly 100,000 students and 12,000 staff members at more than 200 schools. Over 80% of students are non-White; over 70% of the students are eligible for free or reduced-cost lunch; the mobility rate is nearly 30%; and, the high school attendance rate is only 77%.

A common purpose of each study was to increase the capacity of district and school leadership and of teaching personnel to participate more meaningfully in decision making by improving their analytical capacity and training them to use data to link planning and evaluation to instructional practices designed to improve student learning. The first study incorporated research, at both district and school level, on uses of data for school improvement as a component of systemic reform. The next two studies were specifically planned to simultaneously study and increase the capacity of school-level staff members to effectively use data for improving teaching and learning. The goal of our third and on-going study (SMILE) is to produce models that demonstrate how school staff can develop the organizational, technical, and analytical capacity to measure school improvement and instructional practices and to apply what they learn in a continuous improvement process to both teaching and learning.

All three studies used a design-based research model[2] we have termed "embedded research," in which an interactive partnership between practitioners and the research team blends research and technical assistance to develop and study innovations and interventions in context. This methodology yields greater involvement of both parties and generates a deeper and more precise understanding of the issues and how they are connected in a framework of systemic reform. This leads to the identification of strategies and the formulation of models that are the most plausible pathways to improvement. While similar to design experiments conducted by Ann Brown (1992), and to other

[2] For more information on design-based research, see: Kelly, A. E. (Ed.). (2003). The role of design in educational research [Special issue]. *Educational Researcher, 32*(1).

design-based research methodologies that study forms of student learning, our approach focuses the design-based methodology on adult learners in order to study the elements of school capacity for improvement and educational reform.

A total of 11 schools (5 elementary schools, 4 middle schools and 2 high schools), over 60 teachers, 12 principals, and 12 school learning teams have participated in the three research studies over a six-year period (1998–2003). Demographics, school characteristics, accountability reports, and capacity information were collected for each of the 11 schools selected for participation in the studies. At each school, a series of baseline interviews and focus group sessions were conducted to acquire qualitative information on the school's capacity for data use. A "capacity instrument" for measuring school organizational, technical, and analytical capacity to use data for decision making was developed for use in one of the studies. On site visits, we provided technical assistance and gathered capacity information at regular intervals, charted any changes, and documented progress and problems. We used the capacity instrument, field observations, and documented interactions with the school team to obtain a detailed understanding of how data were being used at the school.

Qualitative research methods were used to gather and analyze data from multiple sources, including interviews, focus groups, observations, and the collection of documents and artifacts. Semi-structured interviews of school staff participants were audio-taped and transcribed. Each technical assistance site visit, all school observations, and telephone communications with school staff were documented in field notes. Focus group meetings were documented in a self-assessment data capacity survey document and field notes. Two researchers were present at each site visit, and each completed a set of post-visit field note summaries using a semi-structured protocol. Interview data and field notes were analyzed using a combination of Microsoft Access and Nudist software. We collected copies of each school's school improvement plan, state and district assessment results, and demographic information, as well as relevant school and classroom data such as classroom assessments, curriculum guides, writing prompts, and rubrics.

Our research methodology was designed to identify capacity issues, organizational problems, and the needs of district and school staff in using data. Initially, the research focused on developing an understanding of the district's information system and of its analytical capacity to use data for school improvement. In later studies, we worked with individual schools to learn more about their challenges and needs when using data. At the school sites, we field-tested the use of learning teams in addressing these problems and needs.

What do schools need to use data effectively?

Data obtained from the first two research studies was used to identify the systemic, organizational, and technical challenges schools and their staffs must address as they build their capacity for using data.

In a systemic review of analytical capacity, all levels of the system must work in concert to meet the goals of reform. For that reason, we began our research for the first study of school data use at the district level, looking at the district information system and decision-support structures to learn how they were designed to assist schools in using data for decision making. We identified several systemic challenges facing MPS and those schools that wanted to use data for reform and school improvement. While noting that collaboration is necessary for innovation in knowledge management and systemic reform, Thorn (2002) found that differences in data needs and uses across the various levels of the district system presented barriers. In 1996, the district needed an information system to manage a complex set of administrative, demographic, and assessment data on over 100,000 students acquired from more than 200 schools. In the *Technology Strategic Plan* (Milwaukee Public Schools, 1996), the district outlined specific data needs for teachers and school administrators who needed a data system for school and classroom management, but who also wanted to use the data system to study and evaluate student performance and school improvement. The district's information system was originally conceived with these school-level data uses in mind, but when designing and implementing the data warehouse and transactional systems, barriers were encountered that led to a compliance-oriented information system that held little value for schools. Schools had difficulty accessing data in the system, and the data that were available were not in a convenient format for school and classroom improvement use. Moreover, many of the data were displayed in an aggregate format that did not allow for extensive analysis by district staff. The limited access of school staff to the data allowed for even less meaningful analysis (Clune & Webb, 1999).

Recently, the systemic links between the district, the district information system, and the schools become more aligned around schools' needs and uses of data. Recent improvements have made the information system more accessible to district administrators and school staff members alike. More data is kept in individual student records and many staff members have been trained in using BRIO software to retrieve data specific to their school and students. The MPS Division of Assessment and Accountability has increased the amount of data assistance it provides to schools by conducting professional development data workshops, electronically transferring data to schools, providing technical assistance for analyzing and applying data, and conducting more in-depth research and analysis of school and student performance data. The data focus has moved from district reporting and compliance to include school improvement and student achievement. Training and technical assistance have become more collaborative and school improvement planning now emphasizes the use of data for continuous improvement. Accountability reports have expanded to include results of annual testing, as well as both school and student performance and progress. Professional development in assessment literacy has reinforced school-level understanding of state standards and has increased understanding of the primary data sources used to determine student promotion and school improvement progress. The district has trained school leaders in developing professional learning communities to incorporate the analysis and application of school data in planning and evaluating change efforts at the school level. The MPS information system is now more systemically organized and, with the proper

supports, promises to provide some of the necessary ingredients for effective data use (Clune & Webb, 2001, 2002; Webb, 2002).

In our second study of school-level data use, we found that it was necessary for both school administrators and teaching staff to develop the processes and skills to become more savvy consumers of data. We found that individuals varied greatly in their comfort and knowledge when acquiring, analyzing, and using data. We were most successful in encouraging schools to use data when we were able to establish a formal problem-solving, program-evaluation, or action research orientation that required school teams to select a focus, frame questions, collect and analyze relevant metrics and data, and translate reports into action plans with a continuous improvement focus.

In working with the six Milwaukee schools in this study, we learned that to be effective data use must become an active part of school planning and improvement processes, and it must become infused and accepted in the school culture and organization. Additionally, school staff members must develop the analytical capacity to understand and strategically apply data. Once fully integrated into a school's systems, data can be transformed from mere numbers to useful information, which can then contribute to the staff's knowledge in effective and meaningful ways.

The application of data to decision-making presents an array of complex challenges for schools. These challenges must both be addressed initially and attended to continuously if a school is to make successful and effective use of its data. We have identified six challenges schools need to confront as they build their capacity for using data for decision-making: 1) cultivating the desire to transform data into knowledge; 2) focusing on a process for planned data use; 3) committing to the acquisition and creation of data; 4) organizing data management; 5) developing analytical capacity; and, 6) strategically applying information and results (Mason, 2002).

What do teachers need to learn from data?

At the start of each school-level research study, we interviewed school administrators and teaching staff members who planned to participate in the study. More than 50 teachers were asked to respond to questions regarding their current data use, and to identify their data-related skill development and resource needs. They spoke of the current pressures on schools and teachers to understand and use data and suggested better ways to motivate school staff. Analysis of these teacher interviews across all three studies has revealed additional organizational needs and challenges specific to teachers' capacity to learn from data.

When asked about their current use of data, teachers responded that they use data in a variety of ways:

- To improve and evaluate instructional strategies
- To write grant applications

- To identify student strengths and weaknesses, areas of need, progress, and proficiency levels
- To organize "anecdotal evidence"
- To communicate with and motivate other teachers

At the same time, teachers responded that their use of data was infrequent, often random, and conducted in isolation from other teaching staff. They often characterized their data use as one-time occurrences, sometimes associated with a specific purpose in mind, such as obtaining grant money, or writing a master's paper. While they reported that they sometimes shared the information with other teachers, it was never referred to as a common or regular practice. Often teachers referred to the *one* teacher or administrator in the school who was a "data expert," noting that the rest of the staff relied on this person and did not use data themselves. Moreover, the data used by teachers was often limited to paper reports of state and district test results. Few teachers collected data in their own classrooms, sought out demographic or behavior data on their own students, or compared classroom assessment results to school, district, or state assessment results. Typically, use of data was not comprehensive throughout the school, nor was it consistent or continuous.

When asked what additional data they would like to have, or what data they would find useful, teachers responded that they needed:

- School- and classroom-level data
- Data with an instructional focus
- Disaggregated data
- Individual student data
- Longitudinal data and historical records
- Behavior and attendance data
- Student home and background data
- Quick access to timely data

Teachers wanted to use these data to identify students' needs both inside and outside the classroom. They wanted to use the information to target their instruction and assistance to students. As one teacher responded: "The problem I see is kids not learning, and if data could zero in on where we can do the most good, in time . . . "[3] Others responded that a wide range of data was already collected at their school, but that they needed help in accessing and using it: "We need data that we can manipulate in the school and that can be accessed."

These types of responses led the way to a discussion of the skills and resources teachers felt they needed to use data more effectively. Teachers recognized that their skill needs covered a wide range, with most falling under the following categories:

---

[3]To protect confidentiality, the names of teachers are not given. All quotes from teachers are taken from interviews conducted during the course of our research over the last six years.

- Assessment literacy
- Alignment among assessment, curriculum, instruction, and standards
- Technology (computers, software, databases)
- Data skills (management, analysis, and application)
- Identifying strategies for change

Teachers spoke of wanting to learn these skills in order to: improve learning in the classroom and school; identify strengths and weaknesses in curriculum and instruction; target student needs; ask better questions and get better answers; measure student progress towards proficiency; create visual representations; communicate with students, parents, and other staff; and identify strategies for change.

In order to learn these skills and improve their ability to use data effectively, teachers recommended that the following resources and supports be provided:

- Professional development
- Time to work with data both individually and collectively
- Access to data
- Administrative support
- External sources for strategies and research-based practices

Having time to learn about and use data was critical to many teachers. Without support from school administrators, including a commitment to provide time for teachers to learn how to use data, they felt their personal use of data would remain sporadic. They wanted time, in school, to learn with each other how to use data and share results. Using data alone, in their classroom, was not considered to be efficient or an effective use of their time. They noted that the process for using data had to be user-friendly and provide meaningful and useful feedback to teachers. They spoke also of the need for professional development for teachers to learn about data use and the need for greater opportunities to incorporate data into their current planning and development.

Teachers also talked about their motivations for and against using data. External incentives driving data use were referred to largely as "pressures." Teachers referred to pressures to improve student test scores to meet new accountability guidelines under national, state, and district accountability systems. Many talked about the district's student proficiency, promotion, and graduation systems as placing new responsibility on teachers to improve student performance. They reported that being able to interpret the assessments and assessment results to understand where they and their students "stood" has become increasingly important. They spoke of needing to know the strengths and weaknesses of student performance so they could identify students' learning needs in time to bring them up to proficiency. These external pressures to use data were mostly considered to be negative and were referred to as a "burden" rather than as positive motivation to learn. However, most teachers recognized the importance of using data and the role incentives might play in motivating teachers' data use to improve teaching and learning at their schools. One teacher captured the general feeling expressed by many of those interviewed, and suggested a solution: "You've got to have motivation, and I think

it comes from the training of the teachers." Most of the solutions suggested to motivate teachers were incentive mechanisms—requiring internal responses by the school:

- Professional development to increase both "skill and will"
- A shift in emphasis from individual improvement to organizational improvement (i.e., a shared process for continuous improvement)
- Instructional and school improvement focus
- Alignment with standards and curriculum
- Leadership support for time and resources
- Recognition for progress

In these interviews, teachers explained that in order to learn from data and use it effectively, four general areas of need must be met: 1) Data inquiry needs to be a collaborative, shared process; 2) data need to have a learning/instructional focus; 3) professional development needs to focus on assessment literacy, alignment, decision-making processes, data skills, and strategy identification; and, 4) school-level organizational mechanisms must be in place to provide incentives and support for data inquiry, instructional improvement, professional development, and continuous improvement.

The Role of Professional Learning Communities in Using Data: Examples from MPS

In preparing for our most recent study, we reviewed research findings from our previous MPS studies in order to address the expressed needs and identified challenges in building analytical capacity for systemic reform. From our first study, we identified the systemic challenges the district and schools faced in building analytical capacity and coordinating effective data use. In our second study, we conducted case studies of six schools to identify their data needs and the organizational and technical barriers they faced in using data effectively. The findings from both of these studies enabled us to frame our research and design for the third study. The focus of this ongoing study is to identify the characteristics and conditions that lead to effective data-use in schools.

In this section, we use the findings from all of our research as a basis for investigating the role of professional learning communities in supporting systemic reform, organizational learning, and effective use of data by school administrators and teachers. Our research identified systemic challenges, school barriers, and teacher needs facing schools committed to learning from and using data effectively. Systemic reform, organizational learning, and knowledge management theories provide an analytic framework for understanding the components and attributes necessary for meeting these needs and challenges. From our current research, we draw three examples of emerging professional learning communities in MPS schools that address the systemic issues, school challenges, and teachers' needs in using data effectively. The examples shed light on how learning communities function in promoting effective data use.

Building Systemic Data Capacity: Human, Social, Structural and Organizational Capital

The South Middle School Example[4]

South Middle School is a good example of how a school that has a history of using data primarily for accountability can increase its systemic capacity to use data by implementing a professional learning community. South has a history of using data in four distinct and separate ways: 1) School administrators collected paper reports on school demographics and district and state test results and used them once a year to respond to district calls for accountability reporting and as a basis for writing grant proposals; 2) student attendance, discipline, course assignments, and grades were collected by the office staff and entered into the student transactional data system; basic frequency reports and individual student records were retrieved; 3) an in-school data expert set up a database to track student scores on the district proficiency and performance assessments—these data were used primarily to report back to the district on 8th grade students' promotion; and, 4) a few individual teachers reported surveying their students to obtain feedback on in-class instruction and using an assortment of classroom assessments to identify individual student learning needs. Staff reported that data was used infrequently and in isolated ways for specific purposes; there was little sharing of data among staff or between administration and teachers. The focus of their data was on student and school accountability—it was used to track student behavior and determine promotion and to document school performance and compliance reporting. At the start of the 2002-2003 school year, South was identified as one of 56 Milwaukee "schools in need of improvement" as defined by the state of Wisconsin and the revised Title I of the *No Child Left Behind* legislation.[5] This designation put added pressure on the school to monitor their student performance data and accountability measures.

With this data history and the current mindset instilled by the need to improve student test scores, the staff at South began participation in our study. One of their first tasks was to form a team of participants. South formed a rather large and inclusive team consisting of a cross-section of the school's staff, including the principal, assistant principal, technology coordinator, literacy coach, Special Education coordinator, and a number of teachers from different subject areas. At the start, the team's main goal for using data was to learn how to set up a database to disaggregate state and district test scores and identify grade levels, student groups, and subject areas needing attention. Under their current accountability pressures, they were initially concerned only with improving their students' test scores on the state assessments. However, over the course of the study, the team shifted its focus from using data solely for accountability purposes to using data at a deeper level. The team wanted to learn more about the assessments—what objectives were measured in each subject area and how those aligned with school

---

[4] The names of the middle schools and elementary school are fictitious.

[5] Milwaukee Public Schools, Office of Research & Accountability. (2002) *Milwaukee Public Schools' 2001-2002 Report Card: 2001-2002 District Report* (December 3, 2002). Milwaukee, WI: Author. Available at: http://www.milwaukee.k12.wi.us/fileBroker.php/4942/3-District.pdf [Accessed April 3, 2003].

curriculum and state standards. Team members decided this information would help them interpret their test scores in a more meaningful way and would allow them to better identify the strengths, weaknesses, and gaps in their students' learning and in their curriculum. They also chose to look more closely at their classroom-based assessments (used to decide 8th grade promotion) to see how these aligned with the state standards, the curriculum, and student performance on state tests. They used this information to monitor change and progress in student performance, identify areas in their curriculum that needed supplementation or improvement, and to evaluate the effects of new strategies on performance.

These goals for learning from data mark a shift in the team's thinking about data. They were no longer seeing data solely as a source for accountability and compliance, but as a tool for building an information and knowledge base about teaching and learning at the school. This transformation in thinking came from a variety of sources: the collaborative setting of the team (which allowed new voices to be heard and new ideas to emerge), our requests to select a "focus" for their data inquiry (they chose to look at mathematics achievement), and their need to understand data at a deeper level in order to inform reflection, action, and improvement. The team's approach to data use began to develop and take on all the key characteristics of a professional learning community. It was a new way of thinking that reflected the beginning of a change in the school's organizational culture as it viewed, applied, and valued data. Moreover, the establishment of a professional learning community began to change the organizational structure of the school—particularly in regards to how the school was organized to learn from data. Data were no longer managed by one data expert, or kept in separate departments for discrete uses. Instead, data were being developed and retrieved for use by many teachers in the school and for a wide range of purposes.

The professional learning community has helped South to build its capacity to use data. Spillane and Thompson's (1997) and Century's (2000) concepts of capacity provide a useful way to assess South's progress in building its capacity to use data. South has increased its human capital by shifting its commitment to use data from accountability to instructional improvement. Teachers' and administrators' dispositions toward data have changed for the better, as they now see value in using data to meet their own needs, rather than as a descriptive tool or as a source for meeting compliance. We saw an increased interest in and readiness among staff members to use data and to see it as a legitimate source for learning. The social capital of the school changed as staff began to seek additional data and technical assistance from the district and from us as researchers, and began to relate to each other in a sort of professional network. The organizational capital for using data also improved, as the team members increased interaction and collaboration with each other by interpreting data, discussing its implications, and sharing feedback with others. Finally, South has begun to build structural capacity around the use of data. At mid-year, the "data expert" at South transferred out of the school, which meant the school lost much of its vested capacity for using data. However, through their work on the study, team members have recognized the importance of distributive leadership, resources, and formal mechanisms for using data. They have begun to reallocate their data expertise and resources and are rethinking their school-wide policies

and practices around assessment data. The team has started to align its curriculum and assessments to the state standards, interpreting objective performance and item analysis results from the state tests, and now discusses and shares results with teachers as they plan strategies to address weaknesses in student performance and curriculum. South has improved its use of data to inform and align the components of systemic reform.

While the installation of a professional learning community was integral to the process of building data capacity and systemic reform capacity at the school, much work still needs to be accomplished. Even though there is an improved sense of purpose and motivation toward using data more broadly in the school, tensions between the administration and staff still remain and the school does not yet have shared values and direction regarding reform. It is not clear whether the professional learning community is ingrained enough in the school's culture or organizational structure to help build sufficient human capital and consensus for reform. Social capital at the school has increased with renewed interest in aligning the school's classroom-based assessments with the district's new learning targets. Yet, this interest mainly resides with administrators; the teaching staff has not "bought into" the idea of the need for alignment and consistent measures of student performance. As yet, many staff members have not consistently attended team meetings, and it is uncertain whether the network that was beginning to emerge during the study will become institutionalized in the building. Staff may resist efforts on the part of administration to formalize the classroom assessment process. The organizational and structural capital the school has built over the last year is fragile as well. While the professional learning community promoted interaction, collaboration, and sharing around the use of data, it is far from certain that the team will be able to expand this interaction beyond the scope of the project. Finally, maintaining structural capacity will depend on school leadership to support, maintain, and allocate the time and resources for distributed ownership of data.

Addressing School Challenges

The North Middle School Example

North Middle School could be described as a "data savvy" school in that it has utilized data in a variety of unique ways for a number of years. For example, three years ago, North began to analyze "event-based" data, a term used to describe data that refers to a specific incident or action, rather than to a test score or student demographic variable. By tracking the patterns of events such as discipline referrals and attendance infractions, school staff learned more about where, when, and how often certain events occurred. The principal provided summary information on a variety of events that occurred during the semester to teams of teachers. These summaries were used to encourage discussion and create understanding about the patterns of student behavior and teacher behavior management practices at the school. The data were also used to support decisions about resource allocation—e.g., the school planned to hire an additional counselor to help students who encounter out-of-school difficulties that staff members believe affect student behavior at school.

North Middle School is organized by family teams, to which the principal presents his findings and monthly reports. The school relies primarily on the principal for collecting, managing, and presenting these data. The school is working on organizing MPS Educational Plan data so that growth and change over time can be analyzed, but currently has no system for analyzing gains in classroom data. In the 2002-2003 MPS Educational Plan, North identified a need to improve reading instruction school-wide and developed target goals to measure the progress of change and the impact of their improvements. The analysis methods, limited by the data available, primarily relied on comparing school averages to the district and state averages, and on disaggregated averages and frequencies. Typically, their MPS Educational Plan and classroom learning data were contained within subject areas—there was not much "cross-talk" regarding the results between teams or among teachers. Staff members reported that they were not as successful at analyzing and using performance data as they were in using process and behavior data. While much process data were collected, maintained, and reported to school staff on a monthly basis, staff members say that these reports spurred limited discussion and were infrequently applied to specific questions or problems. While data were used to guide change in school and classroom processes two or three times a year, school-wide change strategies and interventions were evaluated only once a year.

As part of the goal in participating in our study, the North principal expressed a desire to expand the school's use of data to the family and classroom level. His desire was to increase teacher ownership of data and to improve the data culture of the school. Uppermost in his mind was the need to make the data accessible, user-friendly, and meaningful to teachers. It was important, too, to move beyond the "event–based" process and behavior data to use student-learning dat to contribute to teacher learning about how to improve classroom instruction. To accomplish these goals, the principal asked for interested teachers and staff members to join the study. The resulting team members decided to focus on learning more about their students' reading performance and progress, a major goal in their 2002-2003 MPS Educational Plan. The team split into two work groups. One organized a database of all the existing reading-related data to analyze current reading performance status of students; the database will also be used for future data collection and analysis. The other work group designed and conducted a survey of teachers' use of reading strategies across the curriculum. The purpose of the survey was to evaluate current practice and identify a set of effective strategies to use consistently across families and subject areas. They plan to implement these strategies next school year (2003-2004) and to both evaluate their progress (by surveying the teachers again) and evaluate the strategies' impact on student reading (by analyzing pre-post reading test scores). The goal was to improve reading performance in every subject area by using strategies endorsed by teachers and by promoting consistent strategies throughout the school. While the work groups performed their tasks separately, they met regularly to share information, offer suggestions, and provide feedback.

Through our case study research, we have identified six challenges schools need to confront as they build their capacity to use data for decision-making. In our study, North was able to address each of these challenges with a degree of success. Below is a summary of each challenge and an explanation of North's approach to meeting the

challenge. We also highlight the role of its professional learning team in helping the school meet the challenges of using data.

The first challenge is for schools to create a school culture that not only encourages the use of data, but that looks upon data as a source of information that can contribute to problem-solving and knowledge-building. It is essential for school leadership to gather support, commitment, resources, and direction to ensure that school data efforts are a success. Building this type of data culture or environment within a school may require significant professional development and frequent meetings with staff in which data play a role. North Middle School entered our study with this purpose in mind—to improve the data culture in the school by getting a greater number of teachers involved in using data and by developing new ways to put meaningful data into the hands of all teachers in the school. The project team—a professional learning community in itself—was supported by the principal with resources, time, and technical assistance to learn how to access and use the current databases. The goal of the work groups was to collect and analyze data and to share the results with the entire school staff to improve instruction and track the progress of students in reading. By sharing and using data with the entire school, all staff members could become more informed data consumers and learn to turn it into useful knowledge for problem solving and improvement.

Second, it is important for schools to focus their use of data by linking it to their school planning and decision-making processes. A focused approach saves time and effort, allowing for more efficient use of limited data. An approach that aligns data inquiry to school planning and decision-making processes from the start is more likely to produce answers to specific questions, provide evidence to support school goals, and utilize information that can shed light on identified problems. Planned and targeted data inquiry can help to keep data analysis on track, as well as ensure that information is fed back into the planning process and that key decision-makers get the answers they need. The North team benefited greatly from identifying a specific focus for its work. Members selected a focus that crosscut the entire school (reading is not a specific course in the middle school, but rather taught across the curriculum). By starting with the school's MPS Educational Plan and identifying the area of greatest need, they ensured that the work would have a results orientation and be aligned with their school goals. The focus on reading also helped each of the work groups identify relevant questions to frame their data collection and analysis.

Third, acquiring the right data means becoming more familiar with the district's and the school's own information systems and databases. To get the specific data needed, schools have to create new data sources and conduct additional data collection. This extra work requires the dedication of resources, time, and personnel. The North team members spent a great deal of time accessing data from a variety of sources—the district information system, their own databases, and reading program software. They learned how to merge these data into a comprehensive reading database for the school. The survey group learned how to create new data resources by designing and conducting their own survey of teacher reading strategies. In the process of conducting their data inquiry, each team member became more familiar with the district's information system, state

assessment results, and district-level resources, as well as with his or her own school-level databases and reading information resources. The team structure of the work groups facilitated the development of new knowledge of data sources within and outside the school building. Team members were able to maximize their time by distributing the data tasks and maximize their learning by sharing their results with each other.

Fourth, there are significant problems associated with data management that require organization, additional resources and staffing to resolve. There is a big gap between data collection and data application. In between, data must be cleaned, secured, updated, imported into analytical software, analyzed, and formatted for reporting. To prevent this flow of data from becoming interrupted, the processes must be well defined, organized and maintained on a continual basis. Getting organized to better manage, maintain, and apply data will be necessary if a school is to incorporate data seamlessly into its professional learning and decision-making operations. The North team struggled with this challenge, since they were used to relying on their principal and office staff to procure, manage, and analyze data. The team began slowly to access data from existing databases, build new ones, and tackle the task of analyzing and developing reports. The team set up its databases with an eye toward continuous improvement and collective inquiry. Members of each work group learned how to set up the databases and spreadsheets for their data inquiry. They distributed the responsibility of learning how to collect, manage, and maintain the data. They designed the databases to inform current inquiry as well as to support future reflection and evaluation and to provide answers to new questions. The principal purposefully took a hands-off stance to encourage the team members to learn these skills on their own. At the same time, he provided technical assistance when needed and encouraged the team to make its own decisions regarding the analysis and sharing of data with other staff members.

Fifth, staff members require additional training to improve essential analytical skills and abilities. Staff members need to learn how to ask better questions, how to select the appropriate indicators to identify strengths and weaknesses, and how to report, interpret, and use the results. Staff participants in the study at North stressed the importance of learning how to develop their analytical capacity. From the beginning, they took a professional interest in learning how to frame questions, read and interpret test results, and analyze survey data. At the time of this writing, the North team is still working through the analysis stage of its data inquiry process. The two work groups have worked with our researchers to learn how to frame their analysis, link their questions and goals to their data sets, and produce appropriate visual representations and reports. In the upcoming month, they will develop reports and recommendations based on their findings to share with the rest of the school staff to inspire discussions and decisions regarding changes in their reading program. It is too soon to tell how useful the data results and reports will be to North's planning and decision-making processes.

The sixth and final challenge for schools is to learn how to appropriately apply data results and make purposeful and ethical uses of information for improving teaching and learning. If schools have followed a continuous improvement process for planning and decision making, the results will be easily linked back to specific questions, goals,

and problems. By focusing the data analysis to target specific issues, schools will be poised at the end of the analytical process to make sense of and draw meaning from their results. The final step is to share the new information and results with staff members to inform school planning and decision making. The results can be used in a variety of ways—to identify progress, explore problems, and target strategies for change, to mention a few. The North team has participated in a data-inquiry process that will poise them for making such a strategic application of their results. Their teamwork has been organized in ways to address each of the school challenges for using data effectively. They have made significant progress in building a school-wide data culture and in transforming the school into a learning organization. Critical to that process was the development of their team as a professional learning community. In addressing the challenges of learning to use data effectively, the team employed all the main features of an effective professional learning community:

1. Shared mission, vision and values
2. Collective inquiry
3. Collaborative teams
4. Action orientation and experimentation
5. Continuous improvement
6. Results orientation (DuFour & Eaker, 1998, pp. 25-29)

Meeting Teacher Data Needs

In our interviews, teachers explained that in order to learn from data and use it effectively, four general areas of need must be met: 1) Data inquiry needs to be a collaborative, shared process; 2) data needs to have a learning/instructional focus; 3) professional development needs to focus on assessment literacy, alignment, decision-making processes, data skills, and strategy identification; and, 4) school-level organizational mechanisms must be in place to provide incentives and support for data inquiry, instructional improvement, professional development, and continuous improvement.

The West Elementary School Example

The team at West Elementary School is our most teacher-centered team, comprised of one teacher for every grade level in the school, and the school's literacy coach and curriculum implementer (both of whom used to be teachers at the school). While the principal has attended many of the meetings and been very supportive of the study, she has confidently allocated the leadership and work for the study to the team. This team provides an excellent lens for investigating the role of professional learning communities in meeting teacher needs for learning from data and using data effectively.

West Elementary School uses a global education curriculum that features a strong emphasis on basic skills. West utilizes district test scores, results from curriculum unit tests, assessment programs, and student portfolios. The school collects MPS Educational Plan data once a year; other student learning data (such as classroom-based assessments

and writing samples) are collected two or three times a year. Overall, technology plays a limited role in data use at the school, except for some computer-generated reports. School-wide data are collected and managed by one or two staff members and the principal. MPS proficiency data is kept in paper binders. Most data analysis is limited to the comparison of averages and is used to guide change in the school and classrooms twice per year. This year, the staff conducted for the first time an objective performance index analysis of their TerraNova state test results. This year too, staff members report having access to improved data-related training, which has helped to increase "ownership" of data and responsibility for student learning among staff. Sharing of data and conclusions occurs occasionally (generally through mixed grade-level team discussion on district professional development days). However, staff members and the principal report that the process of using data to influence curriculum and instruction and disseminating data to relevant staff is limited. In August, 2002, West was identified for the first time as one of 27 Milwaukee elementary "schools in need of improvement." Learning of this designation based on the 4th grade students' poor performance on the state assessment in mathematics, the staff reviewed the tests results and became convinced that the problem resided in gaps in their curriculum and/or instruction. Participation in our study provided an opportunity to conduct an in-depth evaluation of their mathematics program.

West teachers wanted to learn about the scope and sequence of their mathematics curriculum from kindergarten through grade 5. They instinctively believed that many of the state standards were not being covered and that students may not be prepared early to learn skills and content presented (and assessed) in the later grades. They were also concerned about the pacing to the curriculum in grades 3 and 4, as students seemed unprepared for the state testing that occurs in November. West teachers formed a team, with one teacher from each grade level, to further research their student performance strengths and weaknesses, to align their curriculum with the state standards and state assessments, and to develop standards-based learning targets or performance measures that could be used throughout the year to measure student progress.

One of the unmet needs teachers identified in interviews is that data inquiry needs to be a collaborative, shared process. Teachers said they needed to leave the isolation of their classrooms and have opportunities to work and learn with their colleagues. Developing the skills and abilities to use and apply data in a collaborative setting where experience can inform sharing and learning is what teachers sought. To accomplish their data inquiry tasks, the team at West decided to work in a collaborative manner, with a commitment on the part of each team member to learn new skills and processes. The team meets regularly and exhibits a high degree of professional involvement. Each member of the team contributes to discussions, sharing experiences in the classroom and with students. This "real world" lens helps to interpret data, validate findings, and legitimize decisions. The team also has fun—meetings include snacks and humor—making the time spent less a burden. As a result of their meetings, a sense of collegiality and a positive "data culture" is beginning to emerge.

Teachers interviewed in our studies also identified the types of data that would be most meaningful, and most useful, in informing improvement in the classroom. They said, above all, that data needed to have an instructional focus to provide feedback beyond the typical once-per-year assessment data and student discipline data available to teachers. In addition, professional development is needed and should focus on assessment literacy, alignment, decision-making processes, data skills, and strategy identification. West teachers began their data inquiry by creating their own analysis of their curriculum. In the process of aligning their curriculum to the state standards and assessments, they learned that instructional data comes in many forms and from a variety of sources. They learned to break down, align, and interpret content standards and curriculum objectives. They increased their assessment literacy by learning more about the details of how student learning is measured in standardized, norm-referenced tests. They even developed their own performance indicators to measure student progress towards the standards, using their classroom curriculum and assessments. The team learned these data skills during the course of our study; the process was intensive and required input from all teachers. They also expanded the scope of their data to provide information on curriculum and the standards and to draw connections between classroom curriculum and assessments to the state assessments, by which school performance is determined.

The fourth area of need teachers identified in our interviews related to incentives and supports. School-level organizational mechanisms must be in place to provide incentives and support for data inquiry, instructional improvement, professional development, and continuous improvement. We have already noted that the team at West has made great progress in learning data inquiry processes and skills, focusing on improving instruction. West has also taken care to consider how these processes and skills can be disseminated throughout the school. Team members decided that their use of data and analysis needs to be shared with the entire staff and should be ongoing to become part of the school improvement processes on a regular basis. Both incentives and supports play a role in perpetuating the team's interest in learning from data and using data to support school-wide change and improvement. While their initial incentive to embark on a data inquiry process was inspired by their designation as a school needing improvement, these "external pressures" were not all that sustained their inquiry. Rather, the team received administrative support in terms of time, access to data, authority to make team-based decisions, and endorsement of its work. This active support and recognition of hard work and progress on the part of administration became a type of incentive for the team to learn and grow. The team structure facilitated professional development of individual teachers, increasing their motivation to learn about and use data. The team structure also allowed teachers to think about improvement beyond the individual professional sphere to include organizational and school improvement. By expanding the sphere of influence, their data inquiry took on more meaning and became more important to the participants.

The team at West operated successfully by meeting all the teacher-identified needs for using data and by operating as a professional learning community. The common focus was to evaluate the mathematics program—a process bolstered by shared beliefs about what needed improvement in the curriculum and in instruction. They

worked collaboratively, with a representative team of committed teachers, who shared their experiences and learned from each other. They were open to exploration and to learning new skills. They have begun to apply what they learned and to share it with others. Team members were committed to continuous improvement, not just in individual classrooms but school-wide. All these traits are essential to what DuFour and Eaker (1998) recommend as best practices for enhancing student achievement through the use of professional learning communities.

Summary: Learning from Data in a Systemic Reform Context

It is clear that using data effectively at the school level for organizational learning and systemic reform is a complex undertaking. Our studies of the Milwaukee district and schools were designed to reveal the capacity builders, barriers, needs, and conditions necessary for such successful data-use. From the systemic reform literature, we borrowed the analytical framework of human, social, organizational, and structural capital for evaluating the analytical capacity of districts and school. We defined success as effective use of data—data that is transformed into useful knowledge for affecting active reform and improvement of a systemic nature. From our embedded research studies, we identified the key challenges facing schools as they implement or improve their use of data. We also discovered what teachers need in order to be motivated to make sense of data, learn from data, and apply data in meaningful ways. Our initial intention was not to study professional learning communities per se, but these organizational structures proved time and again to match the challenges and needs of school level staff seeking to use and learn from data.

In the course of our research, we have learned that in addition to building school-level culture, processes, and skills, schools also need to create organizational and structural mechanisms for using data to improve teaching and learning. We learned that decision making and reform capacity needed to be distributed beyond the scope of administrators to include classroom practitioners. We have learned that many schools are simply not organized to use data to improve teaching and learning. In our most recent study, school teams worked collaboratively to learn about continuous improvement, decision-making and data inquiry processes, and the analysis, application, and use of data. Ongoing field research has revealed that these school teams and the processes they employed exemplify the key characteristics of learning communities. Moreover, these professional learning communities appear to provide an ideal organizational structure to address the challenges of schools and the needs of teachers as they seek to learn from data and use it effectively to improve student learning (Clune & Webb, 2002; Webb, 2001, 2002).

Since our research emphasis was on data use and not on professional learning communities, we did not research variations in school learning organizations and professional learning communities. We do not know whether a successful professional learning community must encompass an entire school faculty or whether a small study group that shares information with other staff for decision making and knowledge building is sufficient for building data capacity. We did not learn what it takes to

institutionalize and sustain effective data use in professional learning communities. However, now that professional learning communities have come to our attention, and appear to hold such promise, we intend to continue to investigate their role in facilitating systemic reform, organizational learning, and effective data use.

References

Brandt, R. (2003). Is this school a learning organization? 10 ways to tell. *Journal of Staff Development, 24*(1), 10-16.

Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *Journal of the Learning Sciences, 2*(2), 141-178.

Century, J. R. (2000). Capacity. In N. L. Webb, J. R. Century, N. Davila, D. Heck, & E. Osthoff (Eds.), *Evaluation of systemic change in mathematics and science education*. Unpublished manuscript, University of Wisconsin–Madison, Wisconsin Center for Education Research.

Clune, W. H. (1998). *Toward a theory of systemic reform: The case of nine NSF Statewide Systemic Initiatives* (Research Monograph 16). Madison: University of Wisconsin, National Institute for Science Education.

Clune, W. H., & Webb, N. L. (1997). *Center for the Study of Systemic Reform in Milwaukee Public Schools* (Proposal to the Joyce Foundation). Madison: University of Wisconsin, Wisconsin Center for Education Research.

Clune, W. H., & Webb, N. L. (1999). *Center for the Study of Systemic Reform in Milwaukee Public Schools—Six Month Report: January-June 1999* (Technical Report 99-2). Madison: University of Wisconsin, Wisconsin Center for Education Research.

Clune, W. H., & Webb, N. L. (2001). *Center for the Study of Systemic Reform in Milwaukee Public Schools 2002-2004* (Proposal to the Joyce Foundation). Madison: Wisconsin Center for Education Research.

Clune, W. H., & Webb, N. L. (2002). *Center for the Study of Systemic Reform in Milwaukee Public Schools: Fourth Annual Report to the Joyce Foundation.* Madison: University of Wisconsin, Wisconsin Center for Education Research.

Davenport, T. H., & Davenport, D. M. (1999, March 8). Is KM just good information management? *The Financial Times Mastering Series: Mastering Information Management,* 2-3.

DuFour, R., & Eaker, R. (1998). *Professional learning communities at work: Best practices for enhancing student achievement.* Bloomington, IN: National Educational Service, and Alexandria, VA: Association for Supervision and Curriculum Development.

Eaker, R., DuFour, R., & Burnette, R. (2002). *Getting started: Reculturing schools to become professional learning communities.* Bloomington, IN: National Educational Service.

Empson, L. (1999, October 8). The challenge of managing knowledge. *The Financial Times Mastering Series: Mastering Strategy,* 8-10.

Feldman, J., & Tung, R. (2001, April). *Whole-school reform: How schools use the Data-Based Inquiry and Decision-Making process.* Paper presented at the 82nd annual meeting of the American Educational Research Association, Seattle, WA.

Fuhrman, S. H. (1999). The new accountability. *Consortium for Policy Research in Education Policy Briefs* (RB-27, January) Philadelphia: Graduate School of Education, University of Pennsylvania.

Fuhrman, S. H. (2001). Introduction. In S. H. Fuhrman (Ed.), *From the capitol to the classroom: Standards-based reform in the states,* The One Hundredth Yearbook of the National Society for the Study of Education. Chicago: University of Chicago Press and the National Society for the Study of Education.

Fullan, M. (1993). *Change forces: Probing the depths of educational reform.* London: Falmer Press.

Fullan, M. (2001). *Leading in a culture of change.* San Francisco: Jossey-Bass.

Glickman, C. D. (2002). *Leadership for learning: How to help teachers succeed.* Alexandria, VA: Association for Supervision and Curriculum Development.

Kelly, A. E. (Ed.). (2003). The role of design in educational research [Special issue]. *Educational Researcher, 32*(1).

King, M. B., & Newmann, F. M. (2000). Will teacher learning advance school goals? *Phi Delta Kappan, 21*(8), 576-580.

Louis, K. S., Marks, H. M., & Kruse, S. (1996). Teachers' professional community in restructuring schools. *American Educational Research Journal, 33*(4), 757-798.

Mason, S. A. (2002, April). *Turning data into knowledge: Lessons from six Milwaukee Public Schools* (WCER Working Paper Series No. 2002-3). Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA. Retrieved April 8, 2003 from http://www.wcer.wisc.edu/publications/workingpaper/paper/Working_Paper_No_2002_3.pdf

Massell, D., & Consortium for Policy Research in Education. (1998). *State strategies for building capacity in education: Progress and continuing challenges* (CPRE Research Report Series RR-41). Philadelphia: Author.

Milwaukee Public Schools' Technology Strategic Plan, December 11, 1996 (Rev. 02/01/97). Retrieved from http://whscdp.whs.edu/tsp/plan/

Murphy, C. U., & Lick, D. W. (2001). *Whole-faculty study groups: Creating student-based professional development* (2nd ed.). Thousand Oaks, CA: Corwin Press.

Newmann, F. M., King, M. B., & Youngs, P. (2000). Professional development that addresses school capacity: Lessons from urban elementary schools. *American Journal of Education, 108*, 259-299.

Schmoker, M. (2001). *The results fieldbook: Practical strategies from dramatically improved schools.* Alexandria, VA: Association for Supervision and Curriculum Development.

Scribner, J. P., Cockrell, K. S., Cockrell, D. H., & Valentine, J. W. (1999). Creating professional communities in schools through organizational learning: An evaluation of a school improvement process. *Educational Administration Quarterly, 35*(1), 130-160.

Spillane, J. P., & Thompson, C. L. (1997). Reconstructing conceptions of local capacity: The local education agency's capacity for ambitious instructional reform. *Educational Evaluation and Policy Analysis, 19*(2), 185-203.

Thorn, C. A. (2000). *Knowledge management for educational information systems: What is the state of the field?* (WCER Technical Report). Madison: University of Wisconsin, Center for the Study of Systemic Reform in Milwaukee Public Schools.

Thorn, C. A. (2002). *Data use in the school and classroom: The challenges of implementing data-based decision making inside schools* (WCER Working Paper No 2002-2). Madison: University of Wisconsin, Wisconsin Center for Education Research. Retrieved from http://www.wcer.wisc.edu/publications/workingpaper/paper/Working_Paper_No_2002_2.pdf

Webb, N. L. (2001). *Strategies and models for effectively using data to improve student learning* (Proposal to the Joyce Foundation). Madison: University of Wisconsin, Wisconsin Center for Education Research.

Webb, N. L. (2002). *Strategies and models for improved learning through effective data use (SMILE). First annual report to the Joyce Foundation.* Madison: University of Wisconsin, Wisconsin Center for Education Research.

Webb, N. L., Mason, S. M., Choppin, J., Green, L. Y., Thorn, C., & Watson, J. (with Andrekopolous, W., & Szopinski, E.). (2001). *Study of electronic information systems in Milwaukee Public Schools: Second-year report* (Technical report to the Joyce Foundation). Madison: University of Wisconsin, Wisconsin Center for Education Research.

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

Reproduction Release
(Specific Document)

TM034945

I. DOCUMENT IDENTIFICATION:

Title:	Learning From Data: The Role of Professional Learning Communities
Author(s):	Sarah A. Mason
Corporate Source: University of Wisconsin-Madison	Publication Date:

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, Resources in Education (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign in the indicated space following.

The sample sticker shown below will be affixed to all Level 1 documents	The sample sticker shown below will be affixed to all Level 2A documents	The sample sticker shown below will be affixe to all Level 2B documents
PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY SAMPLE TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY SAMPLE TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY SAMPLE TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
Level 1	**Level 2A**	**Level 2B**
↑ X	↑ ☐	↑ ☐
Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g. electronic) *and* paper copy.	Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only	Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche, or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Signature:	Printed Name/Position/Title:
Sarah A. Mason	Sarah A Mason Assoc. Researcher

Organization/Address: Wisconsin Center For Education Research 1025 W. Johnson St. Madison, WI 53706	Telephone: (608) 265-5642	Fax: (608) 263-6448
	E-mail Address: samason@wisc.edu	Date: 5/2/03

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, or, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:
Address:
Price:

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant this reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:
Address:

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:	
ERIC Clearinghouse on Assessment and Evaluation **1129 Shriver Laboratory (Bldg 075)** **College Park, Maryland 20742**	**Telephone: 301-405-7449** **Toll Free: 800-464-3742** **Fax: 301-405-8134** **ericae @ericae.net** **http://ericae.net**